IN THE CLAIMS

This listing shows the current status of all claims, and replaces all earlier versions and listings.

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1. (Currently Amended) A method of interpolating a first set of discrete sample values to generate a second set of discrete sample values using one of a plurality of interpolation kernels, wherein ~~said~~ the interpolation kernel is selected depending on an edge strength indicator, an edge direction indicator and a local contrast indicator for each of ~~said~~ the discrete sample values of ~~said~~ the first set.

2. (Currently Amended) The method according to claim 1, wherein ~~said~~ the plurality of interpolation kernels ~~is~~ are each derived from a universal interpolation kernel, $h(s)$.

3. (Currently Amended) The method according to claim ~~2~~1, wherein ~~said universal interpolation kernel, $h(s)$, is of the form~~ the plurality of kernels are given by:

$$h(s_x, s_y)_{0 \le \theta \le \pi/2} = \frac{1}{\sqrt{2}} \left\{ h\left(1 - 2\theta/\pi\right)s_x + (2\theta/\pi)s_y\right)_{c=0.5} \cdot h\left((2\theta/\pi)s_x + (2\theta/\pi - 1)s_y\right)w(\theta)\right)_{c=0}\right\}$$

$$h(s_x, s_y)_{\pi/2 < \theta < \pi} = \frac{1}{\sqrt{2}} \left\{ h\left(1 - 2\theta/\pi - 1\right)s_x + (2\theta/\pi - 2)s_y\right)_{c=0.5} \cdot h\left((2\theta/\pi - 2)s_x + (1 - 2\theta/\pi)s_y\right)w(\theta)\right)_{c=0}\right\}_3$$

and wherein $h(s)$ is a universal interpolation kernel, $s_x = x/\Delta x$ and $s_y = y/\Delta y$ are re-sampling distances in the horizontal and vertical directions, respectively, and $\cdot$ indicates matrix

<u>multiplication</u>

$$h(s) = \begin{cases} 1, & 0 \le |s| \le d \\ (2 - \dfrac{3}{2}b - c)\left|\dfrac{s-d}{1-2d}\right|^3 + (-3 + 2b + c)\left|\dfrac{s-d}{1-2d}\right|^2 + (1 - \dfrac{1}{3}b), & d < |s| \le 1 - d \\ 0, & 1 - d < |s| \le 1 + d \\ (-\dfrac{1}{6}b - c)\left|\dfrac{s-3d}{1-2d}\right|^3 + (b + 5c)\left|\dfrac{s-3d}{1-2d}\right|^2 + (-2b - 8c)\left|\dfrac{s-3d}{1-2d}\right| + (\dfrac{4}{3}b + 4c), & 1 + d < |s| \le 2 - d \\ 0, & \text{Otherwise} \end{cases}$$

and wherein $s = t / \Delta t$ and $0 \le d < 0.5$.

4.   (Currently Amended) The method according to claim 1, wherein said <u>the</u> plurality of kernels are given by:

$$h(s) = \begin{cases} (2 - \dfrac{3}{2}b - c)|s|^3 + (-3 + 2b + c)|s|^2 + (1 - \dfrac{1}{3}b), & |s| \le 1 \\ (-\dfrac{1}{6}b - c)|s|^3 + (b + 5c)|s|^2 + (-2b - 8c)|s| + (\dfrac{4}{3}b + 4c), & 1 < |s| \le 2 \\ 0, & \text{Otherwise} \end{cases}$$

$$h(s) = \begin{cases} 1, & -d < |s| \le d \\ 0, & (1-d) \ge s > (1-d) \\ 2\left|\dfrac{s-d}{1-2d}\right|^3 - 3\left|\dfrac{s-d}{1-2d}\right|^2 + 1, \end{cases}$$

$$h(s_x, s_y)_{\theta=o} = \frac{1}{\sqrt{2}} \left\{ h(s_x)_{c=0.5} \cdot h(s_y)_{c=0} \right\}$$

$$h(s_x, s_y)_{\theta=\pi/2} = \frac{1}{\sqrt{2}} \left\{ h(s_x)_{c=0} \cdot h(s_y)_{c=0.5} \right\}$$

$$h(s_x, s_y)_{\theta=\pi/4} = \frac{1}{\sqrt{2}} \left\{ h\left(\frac{s_x + s_y}{2}\right)_{c=0.5} \cdot h\left(\frac{s_x - s_y}{\sqrt{2}}\right)_{c=0} \right\}$$

$$h(s_x, s_y)_{\theta=3\pi/4} = \frac{1}{\sqrt{2}} \left\{ h\left(\frac{s_x + s_y}{\sqrt{2}}\right)_{c=0} \cdot h\left(\frac{s_x - s_y}{2}\right)_{c=0.5} \right\} ,$$

and wherein <u>h(s) is a modified cubic kernel,</u> $s_x = x / \Delta x$ and $s_y = y / \Delta y$ are re-sampling distances

in the horizontal and vertical directions, respectively, and . indicates matrix multiplication.

5.   (Currently Amended) The method according to claim 1, wherein ~~said~~

<u>the</u> first set of discrete sample values are at a different resolution to ~~said~~ <u>the</u> second set of

discrete sample values.

6.   (Currently Amended) <u>The method according to claim 1, wherein the</u>

<u>local contrast indicator is used to indicate a text region</u> ~~A method of interpolating a first set of~~

~~discrete sample values to generate a second set of discrete sample values using an interpolation~~

~~kernel, characterised in that said interpolation kernel is selected depending on an edge strength~~

~~indicator, an edge direction indicator and an edge context indicator for each discrete sample~~

~~value of said first set.~~

4

7.　(Currently Amended) The method according to claim 6~~1~~, wherein ~~said interpolation kernel is a universal interpolation kernel, *h(s)*~~ <u>one or more of the indicators</u> <u>are processed using a morphological process</u>.

8.　(Currently Amended) The method according to claim ~~7~~<u>1</u>, wherein <u>the</u> <u>selection of the interpolation kernel is performed using a kernel selection map processed in</u> <u>accordance with a morphological process</u> ~~said universal interpolation kernel, *h(s)*, is of the~~ ~~form~~:

$$
h(s) = \begin{cases} 1, & 0 \le |s| \le d \\[2mm] (2 - \dfrac{3}{2}b - c)\left|\dfrac{s-d}{1-2d}\right|^3 + (-3 + 2b + c)\left|\dfrac{s-d}{1-2d}\right|^2 + (1 - \dfrac{1}{3}b), & d < |s| \le 1 - d \\[2mm] 0, 1 - d < |s| \le 1 + d \\[2mm] (-\dfrac{1}{6}b - c)\left|\dfrac{s-3d}{1-2d}\right|^3 + (b + 5c)\left|\dfrac{s-3d}{1-2d}\right|^2 + (-2b - 8c)\left|\dfrac{s-3d}{1-2d}\right| + (\dfrac{4}{3}b + 4c), & 1 + d < |s| \le 2 - d \\[2mm] 0, & Otherwise \end{cases}
$$

~~and wherein *s = t / Δt* and *0 ≤ d < 0.5*~~.

9.　(Cancelled)

10.　(Currently Amended) A method of interpolating image data, said method comprising the steps of:

accessing a first set of discrete sample values of ~~said~~ <u>the</u> image data;

5

calculating kernel values for each of ~~said~~ the discrete sample values using one of a plurality of kernels depending upon an edge orientation indicator, an edge strength indicator, and a local contrast indicator for each of ~~said~~ the discrete sample values; and convolving ~~said~~ the kernel values with ~~said~~ the discrete sample values to provide a second set of discrete sample values.

11.   (Currently Amended) The method according to claim 10, wherein ~~said kernel is~~ the plurality of interpolation kernels are each derived from a universal interpolation kernel, *h(s)*.

12.   (Currently Amended) The method according to claim ~~11~~10, wherein ~~said universal interpolation kernel, *h(s)*, is of the form~~ the plurality of kernels are given by:

$$h(s_x, s_y)_{0 \le \theta \le \pi/2} = \frac{1}{\sqrt{2}} \left\{ h((1 - 2\theta/\pi)s_x + (2\theta/\pi)s_y)_{c=0.5} \cdot h(((2\theta/\pi)s_x + (2\theta/\pi - 1)s_y)w(\theta))_{c=0} \right\}$$

$$h(s_x, s_y)_{\pi/2 < \theta < \pi} = \frac{1}{\sqrt{2}} \left\{ h((2\theta/\pi - 1)s_x + (2\theta/\pi - 2)s_y)_{c=0.5} \cdot h(((2\theta/\pi - 2)s_x + (1 - 2\theta/\pi)s_y)w(\theta))_{c=0} \right\},$$

and wherein h(s) is a universal interpolation kernel, $s_x = x/\Delta x$ and $s_y = y/\Delta y$ are re-sampling distances in the horizontal and vertical directions, respectively, and • indicates matrix multiplication

$$h(s) = \begin{cases} 1, & 0 \le |s| \le d \\ (2 - \frac{3}{2}b - c)\left|\frac{s-d}{1-2d}\right|^3 + (-3 + 2b + c)\left|\frac{s-d}{1-2d}\right|^2 + (1 - \frac{1}{3}b), & d < |s| \le 1 - d \\ 0, & 1 - d < |s| \le 1 + d \\ (-\frac{1}{6}b - c)\left|\frac{s-3d}{1-2d}\right|^3 + (b + 5c)\left|\frac{s-3d}{1-2d}\right|^2 + (-2b - 8c)\left|\frac{s-3d}{1-2d}\right| + (\frac{4}{3}b + 4c), & 1 + d < |s| \le 2 - d \\ 0, & Otherwise \end{cases}$$

and wherein $s = t / \Delta t$ and $0 \le d < 0.5$.

13. (Currently Amended) The method according to claim 10, wherein said the plurality of kernels are given by:

$$h(s) = \begin{cases} (2 - \frac{3}{2}b - c)|s|^3 + (-3 + 2b + c)|s|^2 + (1 - \frac{1}{3}b), & |s| \le 1 \\ (-\frac{1}{6}b - c)|s|^3 + (b + 5c)|s|^2 + (-2b - 8c)|s| + (\frac{4}{3}b + 4c), & 1 < |s| \le 2 \\ 0, & Otherwise \end{cases}$$

$$h(s) = \begin{cases} 1, & -d < s \le d \\ 0, & (1 - d) \ge s > (1 - d) \\ 2\left|\frac{s-d}{1-2d}\right|^3 - 3\left|\frac{s-d}{1-2d}\right|^2 + 1, \end{cases}$$

7

$$h(s_x, s_y)_{\theta=0} = \frac{1}{\sqrt{2}} \left\{ h(s_x)_{c=0.5} \cdot h(s_y)_{c=0} \right\}$$

$$h(s_x, s_y)_{\theta=\pi/2} = \frac{1}{\sqrt{2}} \left\{ h(s_x)_{c=0} \cdot h(s_y)_{c=0.5} \right.$$

$$h(s_x, s_y)_{\theta=\pi/4} = \frac{1}{\sqrt{2}} \left\{ h\left(\frac{s_x + s_y}{2}\right)_{c=0.5} \cdot h\left(\frac{s_x - s_y}{\sqrt{2}}\right)_{c=0} \right\}$$

$$h(s_x, s_y)_{\theta=3\pi/4} = \frac{1}{\sqrt{2}} \left\{ h\left(\frac{s_x + s_y}{\sqrt{2}}\right)_{c=0} \cdot h\left(\frac{s_x - s_y}{2}\right)_{c=0.5} \right\},$$

and wherein _h(s) is a modified cubic kernel,_ $s_x = x / \Delta x$ and $s_y = y / \Delta y$ are re-sampling distances in the horizontal and vertical directions, respectively, and . indicates matrix multiplication.

14.   (Currently Amended) The method according to claim 10, wherein ~~said~~ the first set of discrete sample values are at a different resolution to ~~said~~ the second set of discrete sample values.

15.   (Currently Amended) An apparatus for interpolating image data, said apparatus comprising:

means for accessing a first set of discrete sample values of ~~said~~ the image data;

calculator means for calculating kernel values for each of ~~said~~ the

discrete sample values using one of a plurality of kernels depending upon an edge orientation

indicator, an edge strength indicator, and a local contrast indicator for each of ~~said~~ the discrete

sample values; and

convolution means for convolving ~~said~~ the kernel values with ~~said~~ the

discrete sample values to provide a second set of discrete sample values.

16.   (Currently Amended) The apparatus according to claim 15, wherein

~~said kernel is~~ the plurality of interpolation kernels are each derived from a universal

interpolation kernel, $h(s)$.

17.   (Currently Amended) The apparatus according to claim ~~16~~ 15,

wherein ~~said universal interpolation kernel, h(s), is of the form~~ the plurality of kernels are given

by:

$$h(s_x, s_y)_{0 \le \theta \le \pi/2} = \frac{1}{\sqrt{2}} \left\{ h\big((1 - 2\theta/\pi)s_x + (2\theta/\pi)s_y\big)_{c=0.5} \cdot h\big(((2\theta/\pi)s_x + 2\theta/\pi - 1)s_y)w(\theta)\big)_{c=0} \right\}$$

$$h(s_x, s_y)_{\pi/2 < \theta < \pi} = \frac{1}{\sqrt{2}} \left\{ h\big((2\theta/\pi - 1)s_x + (2\theta/\pi - 2)s_y\big)_{c=0.5} \cdot h\big(((2\theta/\pi - 2)s_x + (1 - 2\theta/\pi)s_y)w(\theta)\big)_{c=0} \right\}$$

and wherein $h(s)$ is a universal interpolation kernel, $s_x = x/\Delta x$ and $s_y = y/\Delta y$ are re-sampling

distances in the horizontal and vertical directions, respectively, and $\cdot$ indicates matrix

multiplication

9

$$h(s) = \begin{cases} 1, & 0 \le |s| \le d \\ (2-\dfrac{3}{2}b-c)\left|\dfrac{s-d}{1-2d}\right|^3 + (-3+2b+c)\left|\dfrac{s-d}{1-2d}\right|^2 + (1-\dfrac{1}{3}b), & d < |s| \le 1-d \\ 0, \; 1-d < |s| \le 1+d \\ (-\dfrac{1}{6}b-c)\left|\dfrac{s-3d}{1-2d}\right|^3 + (b+5c)\left|\dfrac{s-3d}{1-2d}\right|^2 + (-2b-8c)\left|\dfrac{s-3d}{1-2d}\right| + (\dfrac{4}{3}b+4c), & 1+d < |s| \le 2-d \\ 0, & Otherwise \end{cases}$$

~~and wherein~~ s = t / Δt ~~and 0 ≤ d < 0.5.~~

18.   (Currently Amended) The apparatus according to claim 15, wherein ~~said~~ the plurality of kernels are given by:

$$h(s) = \begin{cases} (2-\dfrac{3}{2}b-c)|s|^3 + (-3+2b+c)|s|^2 + (1-\dfrac{1}{3}b), & |s| \le 1 \\ (-\dfrac{1}{6}b-c)|s|^3 + (b+5c)|s|^2 + (-2b-8c)|s| + (\dfrac{4}{3}b+4c), & 1 < |s| \le 2 \\ 0, & Otherwise \end{cases}$$

$$h(s) = \begin{cases} 1, -d < s \le d \\ 0, (1-d) \ge s > (1-d) \\ 2\left|\dfrac{s-d}{1-2d}\right|^3 - 3\left|\dfrac{s-d}{1-2d}\right|^2 + 1, \end{cases}$$

$$h(s_x, s_y)_{\theta=o} = \frac{1}{\sqrt{2}}\left\{ h(s_x)_{c=0.5} \cdot h(s_y)_{c=0} \right\}$$

$$h(s_x, s_y)_{\theta=\pi/2} = \frac{1}{\sqrt{2}}\left\{ h(s_x)_{c=0} \cdot h(s_y)_{c=0.5} \right.$$

$$h(s_x, s_y)_{\theta=\pi/4} = \frac{1}{\sqrt{2}}\left\{ h\left(\frac{s_x + s_y}{2}\right)_{c=0.5} \cdot h\left(\frac{s_x - s_y}{\sqrt{2}}\right)_{c=0} \right\}$$

$$h(s_x, s_y)_{\theta=3\pi/4} = \frac{1}{\sqrt{2}}\left\{ h\left(\frac{s_x + s_y}{\sqrt{2}}\right)_{c=0} \cdot h\left(\frac{s_x - s_y}{2}\right)_{c=0.5} \right\},$$

and wherein *h(s) is a modified cubic kernel*, $s_x = x / \Delta x$ and $s_y = y / \Delta y$ are re-sampling

distances in the horizontal and vertical directions, respectively, and · indicates matrix

multiplication.

19.   (Currently Amended) The method according to claim 15, wherein

~~said~~ the first set of discrete sample values are at a different resolution to ~~said~~ the second set of

discrete sample values.

20.   (Currently Amended) A computer readable medium for storing a

program for an apparatus which processes data, said processing comprising a method of

interpolating image data, said program comprising:

code for accessing a first set of discrete sample values of ~~said~~ the

image data;

code for calculating kernel values for each of ~~said~~ the discrete sample

values using one of a plurality of kernels depending upon an edge orientation indicator, an edge

strength indicator, and a local contrast indicator for each of ~~said~~ the discrete sample values of

~~said~~ the first set; and

code for convolving ~~said~~ the kernel values with ~~said~~ the discrete

sample values to provide a second set of discrete sample values.

21.   (Currently Amended) The computer readable medium according to claim 20, wherein ~~said kernel is~~ the plurality of interpolation kernels are each derived from a universal interpolation kernel, $h(s)$.

22.   (Currently Amended) The computer readable medium according to claim ~~21~~ 20, wherein ~~said universal interpolation kernel, *h(s)*, is of the form~~ the plurality of kernels are given by:

$$h(s_x, s_y)_{0 \leq \theta \leq \pi/2} = \frac{1}{\sqrt{2}} \left\{ h\big((1 - 2\theta/\pi)s_x + (2\theta/\pi)s_y\big)_{c=0.5} \cdot h\big(((2\theta/\pi)s_x + 2\theta/\pi - 1)s_y)w(\theta)\big)_{c=0} \right\}$$

$$h(s_x, s_y)_{\pi/2 \leq \theta \leq \pi} = \frac{1}{\sqrt{2}} \left\{ h\big((2\theta/\pi)s_x + (2\theta/\pi - 2)s_y\big)_{c=0.5} \cdot h\big(((2\theta/\pi)s_x(1 - 2\theta/\pi)s_y)w(\theta)\big)_{c=0} \right\}$$

and wherein $h(s)$ is a universal interpolation kernel, $s_x = x/\Delta x$ and $s_y = y/\Delta y$ are re-sampling distances in the horizontal and vertical directions, respectively, and • indicates matrix mulitplication

$$\underline{h(s)} = \begin{cases} 1, & 0 \leq |s| \leq d \\[2mm] (2 - \frac{3}{2}b - c)\left|\frac{s-d}{1-2d}\right|^3 + (-3 + 2b + c)\left|\frac{s-d}{1-2d}\right|^2 + (1 - \frac{1}{3}b), & d < |s| \leq 1 - d \\[2mm] \underline{0, 1 - d < |s| \leq 1 + d} \\[2mm] (-\frac{1}{6}b - c)\left|\frac{s-3d}{1-2d}\right|^3 + (b + 5c)\left|\frac{s-3d}{1-2d}\right|^2 + (-2b - 8c)\left|\frac{s-3d}{1-2d}\right| + (\frac{4}{3}b + 4c), & 1 + d < |s| \leq 2 - d \\[2mm] 0, & \text{Otherwise} \end{cases}$$

~~and wherein *s = t / Δt* and *0 ≤ d < 0.5*.~~

23.   (Currently Amended) The computer readable medium according to claim 20, wherein ~~said~~ the plurality of kernels are given by:

12

$$h(s) = \begin{cases} (2 - \frac{3}{2}b - c)|s|^3 + (-3 + 2b + c)|s|^2 + (1 - \frac{1}{3}b), & |s| \le 1 \\ (-\frac{1}{6}b - c)|s|^3 + (b + 5c)|s|^2 + (-2b - 8c)|s| + (\frac{4}{3}b + 4c), & 1 < |s| \le 2 \\ 0, & Otherwise \end{cases}$$

$$h(s) = \begin{cases} 1, & -d < s \le d \\ 0, & (1 - d) \ge s > (1 - d) \\ 2\left|\frac{s-d}{1-2d}\right|^3 - 3\left|\frac{s-d}{1-2d}\right|^2 + 1, \end{cases}$$

$$h(s_x, s_y)_{\theta=0} = \frac{1}{\sqrt{2}}\left\{h(s_x)_{c=0.5} \cdot h(s_y)_{c=0}\right\}$$

$$h(s_x, s_y)_{\theta=\pi/2} = \frac{1}{\sqrt{2}}\left\{h(s_x)_{c=0} \cdot h(s_y)_{c=0.5}\right\}$$

$$h(s_x, s_y)_{\theta=\pi/4} = \frac{1}{\sqrt{2}}\left\{h\left(\frac{s_x + s_y}{2}\right)_{c=0.5} \cdot h\left(\frac{s_x - s_y}{\sqrt{2}}\right)_{c=0}\right\}$$

$$h(s_x, s_y)_{\theta=3\pi/4} = \frac{1}{\sqrt{2}}\left\{h\left(\frac{s_x + s_y}{\sqrt{2}}\right)_{c=0} \cdot h\left(\frac{s_x - s_y}{2}\right)_{c=0.5}\right\},$$

and wherein _h(s) is a modified cubic kernel_, $s_x = x / \Delta x$ and $s_y = y / \Delta y$ are re-sampling distances in the horizontal and vertical directions, respectively, and . indicates matrix multiplication.

24.   (Currently Amended) The computer readable medium according to claim 20, wherein ~~said~~ the first set of discrete sample values are at a different resolution to ~~said~~ the second set of discrete sample values.